# ABSTRACT OF THE DISCLOSURE

An apparatus and method for performing rapid grain size analysis on a textured polycrystalline material, by generating average grain size and grain size distribution data from x-ray diffraction data of such material. Raw diffraction data is obtained by capturing a plurality of diffraction arcs within a single data capture frame. The raw diffraction data is digitally registered; (3) and the registered diffraction data is filtered to remove background noise, exclude diffraction overlaps or truncations, and compensate for biased data obtained from regions of highly preferred orientations. Average grain size and grain size distribution data are then correlated with the filtered diffraction data. The apparatus for acquiring raw diffraction data includes a collimated x-ray source having means for adjusting beam size and divergence of the x-ray generated, a 2-dimensional area detector for registering diffracted x-ray, and a sample motion assembly for moving the sample in the sample plane. The resulting system is fast, accurate, amenable to automation, and does not require highly skilled personnel to operate.